

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

---

Ex parte DEBORAH ANN LEWIS, VICTOR MARCUS LEWIS  
and DAVID ADRIAN LEWIS

---

Appeal No. 2006-0064  
Application No. 09/155,740

---

HEARD: December 13, 2005

---

Before KIMLIN, PAK and KRATZ, Administrative Patent Judges.  
KRATZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1-19, which are all of the claims pending in this application.

BACKGROUND

Appellants' invention relates to a method of introducing solutes into dried fruits. An understanding of the invention can be derived from a reading of exemplary claims 1 and 2, which are reproduced below.

1. A process for introducing solutes into dried fruit for the production of soft dried fruit which comprises:

(a) Providing dried fruit of a moisture content between 5 to 40% or more;

(b) disrupting the structure of the fruit by a mechanical or physical process producing cracks on the surface and/or edges of the fruit whilst maintaining integrity thereof;

(c) reacting the fruit with a solute solution containing one or more water activity controlling solutes for a time sufficient to allow solute infusion into the fruit, optionally removing, if necessary, any remnant infusion liquid and thereafter drying the fruit to a desired moisture content and water activity, and optionally,

(d) treating the surface of the fruit with one or more sugars.

2. A process for introducing solutes into dried fruit for the production of soft dried fruit which comprises:

(a) providing dried fruit of a moisture content between 5% to 40% or more;

(b) subjecting the dried fruit to a mechanical or physical process which causes cracks in the surface and/or edges of the fruit

(c) whilst maintaining the essential structure and appearance of the fruit;

(d) mixing the fruit with a solute solution containing one or more water activity controlling solutes for a time sufficient to allow complete infusion of solute into the fruit;

(e) removing, if necessary, any remnant infusion liquid and thereafter drying the fruit product to a desired moisture content and water activity; and optionally,

(f) treating the surface of the fruit with one or more sugars.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Reznik	3,741,106	Jun. 26, 1973
Hsieh et al. (Hsieh)	4,917,910	Apr. 17, 1990
Savage	UK 1,004,522	Sep. 15, 1965

Claims 1-19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Reznik in view of Hsieh and Savage.

OPINION

Having carefully considered each of appellants' arguments set forth in the brief and reply brief and the evidence of record, appellants have not persuaded us of reversible error on the part of the examiner in concluding that the appealed claimed subject matter would have been obvious to one of ordinary skill in the art at the time of the invention within the meaning of § 103(a). Accordingly, we will affirm the examiner's obviousness rejection.

Appellants present four groups of claims at page 4 of the brief:

Group I: claim 1;

Group II: claims 2-5, 9-13 and 17;

Group III: claims 6-8 and 14-16; and

Group IV: claims 18 and 19.

We start with independent claim 1 and will separately consider the other claim groupings and a selected representative claim of each such separate grouping to the extent that such groupings have been separately argued.

At the outset, we note that Reznik discloses a process for treating dried dates that includes the steps of: producing cracks or fissures in the surface skin of the dates (column 3, line 6 through column 4, line 20); using a vacuum treatment vessel to introduce water and a preservative or water-soluble agent (solute) into the dates (column 2, line 25 through column 3, line 5); removing the dates from the vacuum treatment vessel; and draining excess water therefrom (column 2, lines 48-50 and column 4, lines 29-32). Thereafter, the hydrated dried dates of a desired softness and a moisture content of from about 25 to 45% can be packaged (column 1, lines 31-42 and column 2, lines 48-50).

Reznik (column 2, lines 63-68) teaches that a "conventional water-soluble agent which will protect the fruit from spoiling in storage" can be added to the water used in the vacuum treatment of the fruit. Reznik (column 1, lines 38-42) suggests that the moisture content of the fruits after treatment with the solute can be from "about 25 to 45 percent." We agree with the examiner

that it would have been obvious to one of ordinary skill in the art at the time of the invention to employ a water activity control solute, such as glycerol as taught by Hsieh, as an additive solute to the fruit of Reznik prior to packaging the treated fruit. This is so because of the aforementioned teachings of Reznik and Hsieh together with the well known use of water activity control agents, such as salts, sugars or glycerol, as additive solute agents applied to fruits for stable storage (preservation or spoilage prevention), as acknowledged by appellants at page 1, lines 26-31 of the specification.<sup>1</sup>

Much of appellants' arguments in the brief and the reply brief, including the opinion declaration of David S. Reid that is referred to for support, are not persuasive because they are based on an incorrect assessment of the entirety of the applied prior art teachings and contemplate inventive subject matter that is not required by the here appealed claims. When the claim does not recite allegedly distinguishable features, "appellant[s] cannot rely on them to establish patentability." In re Self, 671

---

<sup>1</sup>It is axiomatic that admitted prior art in applicants' specification may be used in determining the patentability of a claimed invention and that consideration of the prior art cited by the examiner may include consideration of the admitted prior art found in applicants' specification. See In re Nomiya, 509 F.2d 566, 570-571, 184 USPQ 607, 611-612 (CCPA 1975).

F.2d 1344, 1350-1351, 213 USPQ 1, 7 (CCPA 1982). Consequently, such arguments are entitled to little weight.

In this regard, claim 1 is drawn to a method that includes, inter alia, the steps of: providing a dried fruit<sup>2</sup> of at least 5 percent moisture<sup>3</sup>; employing a mechanical or physical process that produces cracks on the surface or edges of the fruit so as to disrupt the structure of the fruit while maintaining the integrity thereof; and reacting the fruit with a solute solution that includes one or more water activity controlling solutes for a time sufficient to allow solute infusion into the fruit.

Appellants present arguments suggesting that the invention at issue (the appealed claims, including independent claim 1) are drawn to a method that excludes the vacuum step of Reznik based on the recited "infusion" called for. At page 7 of the brief, appellants maintain that:

---

<sup>2</sup> As set forth at page 4, first full paragraph of appellants' specification, the claim term "fruit" is employed in a generic manner by appellants to include traditional whole fruits and pieces thereof. Moreover, appellants list certain vegetables at page 4 of the specification as being included within the meaning of the term "fruit" without restricting that term to those listed as examples.

<sup>3</sup> The claim term "moisture content between 5 to 40% or more" is given its broadest reasonable interpretation and the "or more" language opens the moisture amount to be inclusive of moisture contents up to the maximum moisture amounts that a fruit can include.

the McGraw-Hill Dictionary of Scientific and Technical Terms (fourth edition) defines "infusion" as "the aqueous solution of a soluble constituent of a substance as the result of the substances steeping in the solvent for a period of time." This is consistent with the gentle process described in the application, and clearly excludes abrupt vacuum impregnation, and it demonstrates that those skilled in the art would consider "infusion" to exclude vacuum impregnation.

The referred to dictionary definition relates to a product aqueous solution made by solvating a soluble constituent of a substance using a steeping process (for example, steeping tea leaves in water for making a cup of tea). Such a product is not being claimed at herein. Thus, that argument is not persuasive primarily because such a limited definition for the claim term "infusion" is not required by appellants' specification and claims. In this regard, claim 1 calls for the allowance of "solute infusion into the fruit." Appellants' specification refers to "introducing solutes into fruits" (page 2, lines 29 and 30; page 3, lines 2-5) in a rapid or reduced time. The term "infusion" is employed in the appealed claims and in describing first and second embodiments of appellants' invention in the specification. We interpret that claim term in light of the specification as requiring the uptake or introduction of the solute into the fruit. That latter interpretation is consistent with appellants' specification and in accordance with our

reviewing court's admonition that claim terms are to be given their broadest reasonable construction consistent with the application specification as they would be understood by one of ordinary skill in the art during PTO administrative proceedings. See in re Sneed, 710 F.2d 1544, 1548, 218 USPQ 385, 388 (Fed. Cir. 1983). Moreover, the open "comprising" language of claim 1 does not limit the claimed process to the exclusion of other materials, steps and equipment in addition to that specifically called for in claim 1.

Consequently, we determine that claim 1 is not as limited as argued. Rather, claim 1 is inclusive of a variety of solute uptake methods, including methods using a vacuum as disclosed by Reznik wherein uptake or introduction (infusion) of a solute in the fruit occurs.

In addition, we note that claim 1 does not require a particular water activity and/or a dried fruit product of any particular final moisture or water content. Also, in claim 1 the recited soluble solute/fruit reacting (infusion) step is open to the addition of water (solvent) with the solute. The final fruit product of the method is not required to have any particular water activity. Nor does Reznik require maximizing rehydration, as argued at page 7 of the reply brief.



Plainly, arguments as to what the present invention contemplates or seeks (see; e.g., page 3, lines 1-3 of the reply brief) must correspond to the actual limitation(s) present in a claim to merit consideration of such an argument. Thus, arguments (including the opinions asserted in the Reid declaration related thereto) suggesting that the claimed process differs from Reznik with respect to the free water content of the product obtained, the addition of water, and the final water activity of the product are not persuasive of the unobviousness of the claimed method.

The argued lack of suggestion for one of ordinary skill in the art to modify Reznik by employing a water activity controlling solute in the vacuum uptake (infusion) step of Reznik is not persuasive because Reznik teaches that other conventional water-soluble agents (solutes) may be employed during the vacuum treatment for protecting the fruit. A water activity controlling solute, such as the solutes of Hsieh and those admitted to be known at (page 1, line 26 through page 2, line 3) of appellants' specification represent such conventional water-soluble agents that would act as preservatives for the fruit during storage, as generally suggested for use by Reznik.

While appellants (reply brief, page 2) assert that the water-soluble preservatives listed by Reznik are not water

activity controlling solutes as claimed herein, appellants have not supported that contention with any evidence establishing that solutes, such as the potassium sorbate and sodium benzoate, and the other conventional agents suggested by Reznik would each have no water activity controlling functionality.<sup>4</sup> In this regard, the Reid declaration relied on in the briefs is silent as to the solutes (preservatives) disclosed in Reznik, much less forthcoming with any opinion as to their water activity functionality. In any event, the combined teachings of the applied prior art reasonably suggest the use of known water activity controlling preservatives, as an option for reasons discussed above and in the answer.

Concerning appellants' argument (reply brief, page 6) that adding a water activity controlling agent (solute) to Reznik would inhibit the water absorption properties of the fruit and

---

<sup>4</sup> See appellants' definition of water activity, as furnished in the specification and reply brief. As further explained in the paragraph bridging pages 2 and 3 of the Food and Drug Administration attachment to the reply brief submitted by appellants, "[t]he vapor pressure of a salt or sugar solution is reduced in comparison to that of pure water." In other words, solutes occupy the solvent water such that the partial pressure of the solvent water (water activity) is reduced. This would be an expected (water activity control) functionality for most solutes, including the solutes disclosed by Reznik. See, e.g., the Law of Raoult at page 428 of "The Van Nostrand Chemist's Dictionary" Honig et al. (Ed.), 1953, copy attached to the decision.

change the principal of operation of Reznik, we again note that appellants have not substantiated this argument with persuasive evidence in support thereof.<sup>5</sup> Unsupported arguments of counsel cannot take the place of evidence. See In re Pearson, 494 F.2d 1399, 1405, 181 USPQ 641, 646 (CCPA 1974).

As to the specific question of "teaching away," raised in the briefs, our reviewing court in In re Gurley, 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994) stated:

[a] reference may be said to teach away when a person of ordinary skill, upon [examining] the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.

Here, we agree with the examiner that the admitted prior art and Hsieh provide facts which support the examiner's obviousness contention regarding the proposed modification of Reznik as outlined in the answer and above and Hsieh does not serve as a teaching away from the claimed subject matter as appellants maintain. In this regard, we find no discouragement in Hsieh with respect to using a water activity controlling solute as a preservative in an intermediate moisture food, such as the hydrated dates of Reznik. Reznik clearly teaches that other

---

<sup>5</sup> The total water content of the fruit is not a measure of the water activity thereof.

water soluble agents can be employed in the vacuum hydration step to protect the fruit from spoiling during storage. Thus, this disclosure of Reznik coupled with the admitted prior art teachings concerning the use of humectants (water activity control agents) in foods having intermediate moisture contents for preservation purposes would have fostered little in the way of disincentive in adding such water activity controlling solutes to Reznik. Moreover, the teachings of Hsieh with respect to tumbling raisins and other fruits for adding higher amounts of humectants than otherwise may be obtainable for storage of fruit products with ready to eat cereals has not been shown to constitute a teaching away from using such known humectants for aiding in the preservation of the rehydrated date product of Reznik. The mere fact that more than one way of adding such humectants to fruits may be described in Hsieh, with tumbling providing certain advantages according to Hsieh, does not militate against or teach away from employing such humectants (solutes) in Reznik's vacuum process as agents to deter fruit spoilage during storage.

Appellants contend that one of ordinary skill in the art would not know how to combine Hsieh and Reznik because Reznik is concerned with vacuum rehydration and Hsieh is directed to adding a water activity reducing humectant, particularly glycerol, to

reduce deterioration of a dried fruit during storage. See pages 11-13 of the brief and paragraph 11 of the Reid declaration.

We disagree with that argument for reasons set forth above. In particular, Reznik teaches how that both water and the solute (water soluble agent serving to prevent the dates from spoiling during storage) are added together. Thus, one of ordinary skill in the art considering Reznik in combination with the teachings of Hsieh would understand that the higher moisture content rehydrated dates of Reznik would be better preserved in storage by adding a known water soluble water activity controlling agent thereto, such as a salt or a humectant, such as glycerol.<sup>6</sup> Moreover, Reznik suggests that the amount of moisture added (between 25 and 45 percent) to the dates prior to packaging is a matter of choice or discretion and/or trade practices. See, e.g., column 1, lines 29-42 of Reznik.

We are not persuaded by appellants' contention (brief, page 14) that the claim 1 step requiring the disruption of the fruit via mechanical or physical techniques for formation of cracks on the surface and/or edges of the fruit while maintaining the fruit

---

<sup>6</sup> Because we find that the applied Reznik and Hsieh references coupled with the admitted prior art set forth in appellants' specification are sufficient to establish the obviousness of the claimed subject matter to one of ordinary skill in the art, we need not address the further teachings of Savage as additionally relied upon by the examiner.

integrity is not suggested by the applied references. In this regard, Reznik clearly teaches or suggests using squeeze rollers as depicted in drawing Figures 1 and 2 to develop fissures in the date skin surface without damaging or permanently deforming the fruit. See, e.g., column 3, line 6 through column 4, line 20 of Reznik. Thus, that argument of counsel is not only unpersuasive but is seemingly inconsistent with appellants' acknowledgment that Reznik discloses fissuring at page 7 of the reply brief, as well as numbered paragraph 10 of the Reid declaration. We note that appellants disclose the use of a roller mill, not unlike that disclosed by Reznik, as one way to produce the cracks (fissures). See, e.g., page 5, lines 15-27 of appellants' specification.

As for the opinion expressed in the Reid declaration, including numbered paragraph 11, that the prior art combination proposed by the examiner would not render the claimed subject matter obvious, we note that the opinion of Dr. Reid does not address all of the relevant teachings of the applied references, such as the teachings of Reznik with respect to adding water soluble agents to prevent the dates from spoiling. In this regard, an expert opinion on the ultimate legal question of obviousness that is unsupported by an adequate factual analysis

including a consideration of all of the applied references' teachings, as is the case here, is accorded little weight.

We further note that Dr. Reid does not assert, much less establish, that he is qualified as an expert in patent law, including claim interpretation. Yet, part of the Reid declaration is seemingly directed toward the issue of claim construction and/or is employed in the briefs in a manner so as to render or bolster an opinion as to the reach of the subject matter encompassed by the appealed claims before us that is incorrect for reasons discussed above. Given the above, we determine that the Reid declaration is unpersuasive in establishing the non-obviousness of the appealed claimed subject matter.

Having reconsidered all of the evidence of record proffered by the examiner and appellants, we have determined that the evidence of obviousness, on balance, outweighs the evidence of nonobviousness. Hence, we conclude that the claimed subject matter as a whole as required by claim 1 would have been obvious to one of ordinary skill in the art. Accordingly, we shall sustain the examiner's § 103 rejection of claim 1.

Concerning the examiner's rejection as to appellants' second claim grouping (claims 2-5, 9-13 and 17), we select independent claim 2 as the representative claim. While stating that these

claims are separately patentable, appellants simply maintain that this grouping of claims is patentable for reasons already stated at page 14 of the brief. While appellants refer to claims 9 and 17 at page 4 of the reply brief in discussing the Hsieh reference, that commentary does not amount to a separate argument as to either of those claims with respect to the obviousness rejection over the combined teachings of the applied references. Consequently, we shall also affirm the examiner's obviousness rejection of claims 2-5, 9-13 and 17 for the reasons set forth above and in the answer.

Regarding appellants' third claim grouping (claims 6-8 and 14-16), we select claim 6 as the representative claim. We note that appellants do not contend that the use of the process of Reznik on other fruits, such as an apple piece as recited in claim 6, amounts to another patentable distinction over the applied prior art.<sup>7</sup> Rather, appellants argue that representative claim 6 should be separately patentable because of the relationship between the size of the fruit and roller spacing required by claim 6. However, Reznik teaches or suggests that fruit size and roller spacing are result effective variables for

---

<sup>7</sup> In this regard, we note that Hsieh discloses solute addition to a variety of dried fruits, including dates and apples. See column 3, lines 49-56 of Hsieh.



the fissuring of the fruit. See, e.g., column 3, line 49 through column 4, line 10 of Reznik. Consequently, we agree with the examiner's obviousness assessment in that the determination of the workable or optimum roller spacing for a given fruit size is reasonably considered to be within the skill of the art upon routine experimentation, especially given the trial and error approach discussed at column 4, lines 7-10 of Reznik. See In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) ("[D]iscovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art."); In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) ("[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.").

Accordingly, we shall also sustain the examiner's obviousness rejection of claims 6-8 and 14-16, on this record.

Finally, concerning appellants' group IV claims (dependent claims 18 and 19), we select claim 18 as the representative claim. Appellants further note the water activity limitation recited therein but do not provide any further elucidation as to why the solute treated dates of Reznik, as modified by Hsieh, would not be reasonably expected to achieve a water activity level as claimed. In this regard, we note that appellants

acknowledge that it is known that intermediate moisture foods having a moisture content of 15 to 50 % can have a water activity ranging from 0.60 to 0.85, a water activity range that overlaps the claimed range of 0.2 to 0.65. In this regard, it is well settled that when ranges recited in a claim overlap with ranges disclosed in the prior art, a prima facie case of obviousness typically exists and the burden of proof is shifted to the applicants to show that the claimed invention would not have been obvious. See In re Peterson, 315 F.3d 1325, 1329-30, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003); In re Geisler, 116 F.3d 1465, 1469-70, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990).

Consequently, we shall also affirm the examiner's obviousness rejection of claims 18 and 19, on this record.

#### CONCLUSION

The decision of the examiner to reject claims 1-19 under 35 U.S.C. § 103(a) as being unpatentable over Reznik in view of Hsieh and Savage is affirmed.

AFFIRMED

BOARD OF PATENT  
APPEALS  
AND  
INTERFERENCES

Appeal No. 2006-0064  
Application No. 09/155,740

Page 20

DARBY & DARBY  
805 THIRD AVENUE  
27<sup>TH</sup> FLOOR  
NEW YORK, NY 10022

SCIENTIFIC LIBRARY  
JAN 7 1960  
U. S. PATENT OFFICE

# THE VAN NOSTRAND CHEMIST'S DICTIONARY

---

## < BOARD OF EDITORS >

JURGEN M. HONIG, PH.D.

*Assistant Professor of Chemistry at Purdue University*

MORRIS B. JACOBS, PH.D.

*Director of Laboratories, Department of Air Pollution Control, N.Y.C.*

S. Z. LEWIN, PH.D.

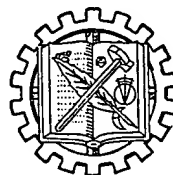
*Assistant Professor of Chemistry, Washington Square College,  
New York University*

WILLIAM R. MINRATH, CH.E.

*Vice-President, D. Van Nostrand Company, Inc.*

GEORGE MURPHY, PH.D.

*Chairman, Department of Chemistry, Washington Square College,  
New York University*



D. VAN NOSTRAND COMPANY, INC.

PRINCETON, NEW JERSEY

TORONTO

NEW YORK

LONDON

BEST AVAILABLE COPY

D. VAN NOSTRAND COMPANY, INC.  
120 Alexander St., Princeton, New Jersey (*Principal office*)  
257 Fourth Avenue, New York 10, New York

D. VAN NOSTRAND COMPANY, LTD.  
358, Kensington High Street, London, W.14, England

D. VAN NOSTRAND COMPANY (Canada), LTD.  
25 Hollinger Road, Toronto 16, Canada

COPYRIGHT © 1953, BY  
D. VAN NOSTRAND COMPANY, INC.

Published simultaneously in Canada by  
D. VAN NOSTRAND COMPANY (Canada), LTD.

*No reproduction in any form of this book, in whole or in part (except for brief quotation in critical articles or reviews), may be made without written authorization from the publishers.*

Library of Congress Catalogue Card No. 53-10098

*First Printing September 1953*  
*Second (Prepublication) Printing October 1953*  
*Reprinted October 1956, July 1959*

PRINTED IN THE UNITED STATES OF AMERICA

Bd.  
QD  
5  
V36  
c. 3  
BEST AVAILABLE COPY

**LAW OF OHM.** The strength of a direct, continuous electric current is directly proportional to the electromotive force and inversely proportional to the resistance in the circuit.

**LAW OF OSTWALD (DILUTION).** The relationship:

$$K = \frac{\alpha^2 C}{1 - \alpha}$$

where  $\alpha$  is the degree of dissociation, and  $C$  is the total concentration of solute. This expression is only approximate, because the effect of the activities of the ions and molecules has been disregarded.

**LAW OF OUDEMAN.** (Law of Landolt-Oudemán) The molecular rotations of the salts of optically active acids or bases always tend to a definite limiting value as the concentration of the solution diminishes; e.g., the soluble salts of  $\alpha$ -bromosulfocamphoric acid show identical molecular rotations in hundredth normal solutions.

**LAW OF PARTIAL PRESSURES.** See law of Dalton.

**LAW OF PARTITION.** See law of distribution.

**LAW OF PASCAL.** In an incompressible fluid, pressure is equally transmitted in all directions and, therefore, if the pressure at any point is increased, there will be an equal increase of pressure at every point. Moreover, in a fluid at rest, the difference of pressure between two points depends only on the difference of level and the density.

**LAW OF PASCHEN.** The sparking potential between electrodes in a gas depends on the length of the spark gap and the pressure of the gas in such a way that it is directly proportional to the mass of gas between the two electrodes, i.e., the sparking potential is a function of the pressure times the density of the gas.

**LAW OF PEPTIC ACTIVITY.** The amount of coagulated protein digested by a peptase is proportional to the time.

**LAW OF PHOTOCHEMICAL ACTION.** See law of Draper.

**LAW OF PHOTOCHEMICAL EQUIVALENT.** See law of Stark-Einstein.

**LAW OF PROPORTIONALITY.** See law of Richter.

**LAW OF PROUT.** See law of definite proportions.

**LAW OF RADIOACTIVE DECAY.** The rate of decay (i.e., rate of decrease in activity) of a radioactive substance is proportional to the radioactivity of the substance at that time; expressed mathematically,

$$-\frac{dI}{dt} = \lambda I$$

where  $-\frac{dI}{dt}$  is the rate of decay of the substance,  $I$  is the instantaneous value of its radioactivity, and  $\lambda$  is the radioactive constant.

**LAW OF RADIOACTIVE DISPLACEMENT OR THE GROUP DISPLACEMENT LAW.** The atomic number of an element produced by a radioactive disintegration is determined by the atomic number of the parent element and by the particle emitted. Specifically, emission of an  $\alpha$ - or a  $\beta$ -particle by an element results in a new element with atomic number 2 units lower or 1 unit higher, respectively, than that of the parent element.

**LAW OF RAOULT.** The vapor pressure of a solution is given by

$$p = p_0 x$$

where  $p_0$  is the vapor pressure of the pure solvent, and  $x$  is the mole fraction of solvent.

**LAW OF RECIPROCAL PROPORTIONS.** (Law of equivalent proportions) The weights, or their multiples and submultiples, of elements reacting with a definite fixed weight of another element, also react with each other. Cf. law of Richter.

**LAW OF RECTILINEAR DIAMETER.** See law of Cailletet and Mathias.

**LAW OF RETGERS.** The physical properties of isomorphous mixtures (mixed crys-